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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/779,816	02/18/2004	Kazuya Takemoto	040061	6818

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EXAMINER
BAUM, RONALD

ART UNIT	PAPER NUMBER
2139	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/779,816	TAKEMOTO ET AL.	
	Examiner	Art Unit	
	RONALD BAUM	2139	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *18 February 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20080319*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in reply to applicant's correspondence of 21 March 2006.

2. Claims 1-13 are pending for examination.

3. Claims 1-13 are rejected.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1-13 are rejected under 35 U.S.C. 102(e) as being anticipated by Shields et al, U.S. Patent Appl. Pub. US 2002/0196827 A1.

5. As per claim 1; "A single-photon generator, comprising:

an exciton generation part including therein

a quantum dot [*Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, whereas the photon source generation via exciton recombination resulting from at least generation by a quantum dot fabricated structure, clearly encompassing the claimed limitations as broadly interpreted by the examiner.*];

an excitation part for

generating an exciton

in said exciton generator part [*Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, whereas the exciton generation resulting from at least generation by a quantum dot structure, clearly encompassing the claimed limitations as broadly interpreted by the examiner.*];

a recombination control part for

controlling recombination timing of

said exciton

in said exciton generation part [*Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, whereas the photon generation via exciton recombination from a quantum dot that is controlled insofar as the photon(s) are recovered/forwarded as required, post exciton recombination, clearly encompassing the claimed limitations as broadly interpreted by the examiner.*]; and

an optical window

provided in said exciton generation part

so as to pass

a single photon formed as a result of

recombination of said exciton [*Abstract, figures 1-30 and associated descriptions, and more particularly para. 0020-0031 0095-0108, 0148-0150 and figure 7, whereas the exciton recombination controlled insofar as the photon(s) are recovered/forwarded as required,*

clearly encompassing the claimed limitations as broadly interpreted by the examiner.],

said recombination control part causing,

in said exciton generation part,

recombination of said exciton

at longer intervals than

a recombination lifetime of

a exciton molecule [*Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, 0071-0075, 0148-0149 and figures 4, 7, whereas the recombination timing aspects so controlled relative to the exciton structure material, clearly encompassing the claimed limitations as broadly interpreted by the examiner.*].".

Further, as per claim 11; this claim is the method embodiment of the apparatus claim 1 above, and is rejected for the same reasons provided for the claim 1 rejection; "A single-photon generating method, comprising the steps of: forming an exciton in a medium; and generating a single photon by causing recombination in said exciton, said recombination being conducted with an interval longer than a recombination lifetime of a exciton molecule in said medium.".

6. Claim 2 additionally recites the limitations that; "The single-photon generator as claimed in claim 1, wherein

said exciton generation part includes

a type II heterojunction in

said quantum dot.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0018, 0110-0111 and figures 16-18, whereas the exciton generation via the quantum dot is such that the fabrication via a type II heterojunction structure is typical, and as such known in the art, clearly encompassing the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

Further, as per claim 13; this claim is the method embodiment of the apparatus claim 2 above, and is rejected for the same reasons provided for the claim 2 rejection; "The method as claimed in claim 11, wherein said medium includes a quantum dot of type II heterojunction.".

7. Claim 3 additionally recites the limitations that; "The single-photon generator as claimed in claim 2, wherein

said quantum dot changes a composition thereof

from one side of said quantum dot to

the other side of said quantum dot

continuously.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0018, 0110-0111 and figures 16-18, whereas the exciton generation via the quantum dot is such that the fabrication via a type II heterojunction structure is typical, whereas

further the quantum dot fabrication would clearly change composition continuously (i.e., at the very least, the inherent 'layers' would form said changing composition through the quantum dot), and as such known in the art, clearly encompassing the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

8. Claim 4 additionally recites the limitations that; "The single-photon generator as claimed in claim 1, wherein

said quantum dot is formed of

a quantum dot grown by

S-K mode growth process.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0018, 0110-0111 and figures 16-18, whereas the exciton generation via the quantum dot is such that the fabrication via a S-K mode growth process is typical, and as such known in the art, clearly encompassing the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

9. Claim 5 additionally recites the limitations that; "The single-photon generator as claimed in claim 1, wherein

said quantum dot is formed of

a lamination of

an InAs layer and

a GaSb layer

sandwiched by

a pair of AlAs layers,

said InAs layer changing a composition thereof

continuously toward said GaSb layer.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0018, 0110-0111 and figures 16-18, whereas the exciton generation via the quantum dot is such that the fabrication via a lamination/sandwiching with InAs, GaSb, AlAs compositions so processed continuously is typical, and as such known in the art, clearly encompassing the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

10. Claim 6 additionally recites the limitations that; "The single-photon generator as claimed in claim 1, wherein

said recombination control part comprises

an electrode provided in said exciton generator part,

a voltage source for applying a bias voltage to said electrode, and

a switch circuit for controlling application of said bias voltage to said electrode,

said switch circuit supplying

said bias voltage to said electrode with

a longer interval than

a recombination lifetime of

said exciton molecule.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, 0084 and figures 14-15, whereas the photon generation via exciton recombination from a quantum dot that is controlled insofar as the photon(s) are recovered/forwarded as required, post exciton recombination, with timing aspects so controlled relative to the exciton structure (i.e., ' molecule '), and the control further via typical electronic circuit/control ('… electrode provided … voltage source for applying a bias voltage … switch circuit supplying …') structures fabricated, and as such known in the art, clearly encompassing the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

Further, as per claim 12; this claim is the method embodiment of the apparatus claim 6 above, and is rejected for the same reasons provided for the claim 6 rejection; "The method as claimed in claim 11, wherein said step of causing recombination of said exciton includes a step of applying an electric field to said medium.".

11. Claim 7 additionally recites the limitations that; "The single-photon generator as claimed in claim 6, wherein

said optical window is provided in

said electrode.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, 0095-108, 0148-0150, and figure 8, whereas the photon generation, exciton recombination, quantum dot controlled insofar as the photon(s) are recovered/forwarded as required, post exciton recombination, with a provided electronically (i.e., via typical electronic

circuit/control) optical window, and as such known in the art, clearly encompassing the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

12. Claim 8 additionally recites the limitations that; "The single-photon generator as claimed in claim 1, further comprising

an optical gate member provided on

a path of said single photon.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, 0095-108, 0148-0150, and figure 8, whereas the photon generation, exciton recombination, quantum dot controlled insofar as the photon (i.e., 'path of said single photon') is recovered/forwarded as required, post exciton recombination, with a provided electronically (i.e., via typical electronic circuit/control) optical gate, and as such known in the art, clearly encompassing the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

13. Claim 9 additionally recites the limitations that; "The single-photon generator as claimed in claim 8, wherein

said optical gate member

is controlled by said recombination control part and

passes said single photon

in synchronization with recombination of

said exciton.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, 0095-108, 0148-0150, and figure 8, whereas the photon generation, exciton recombination, quantum dot controlled insofar as the photon (i.e., 'path of said single photon') is recovered/forwarded as required, post exciton recombination, with a provided electronically (i.e., via typical electronic circuit/control) optical gate, and as such known in the art, clearly encompassing the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

14. Claim 10 additionally recites the limitations that; "The single-photon generator as claimed in claim 1, wherein

said excitation part comprises

a laser.".

The teachings of Shields et al (Abstract, figures 1-30 and associated descriptions, and more particularly para. 0001-0060, 0065-0070, 0081, 0086, and figures 4-7, 9-11, 22 and 24, whereas the excitation mechanism encompassing the use of laser technology, clearly encompasses the claimed limitations as broadly interpreted by the examiner.) suggest such limitations.

Conclusion

15. Any inquiry concerning this communication or earlier communications from examiner should be directed to Ronald Baum, whose telephone number is (571) 272-3861, and whose unofficial Fax number is (571) 273-3861 and unofficial email is Ronald.baum@uspto.gov. The examiner can normally be reached Monday through Thursday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kristine Kincaid, can be reached at (571) 272-4063. The Fax number for the organization where this application is assigned is **571-273-8300**.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. For more information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ronald Baum

Patent Examiner

/R. B./

Examiner, Art Unit 2139

/Kristine Kincaid/

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